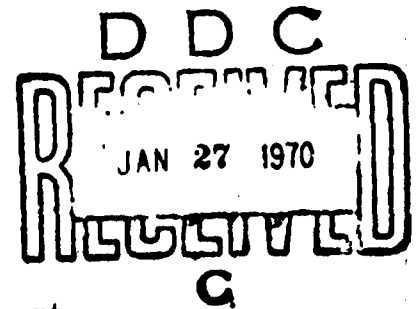# U. S. NAVAL SUBMARINE MEDICAL CENTER

Submarine Base, Groton, Conn.

REPORT NUMBER 586

FACTORS RELATED TO THE FAILURE OF

ENLISTED SUBMARINE SCHOOL GRADUATES TO QUALIFY

by

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COMMANDING OFFICER

Naval Submarine Medical Center

24 June 1969

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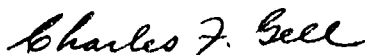
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SUBMARINE MEDICAL RESEARCH LABORATORY

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SUMMARY PAGE

THE PROBLEM

To identify some of the major factors related to the failure of enlisted men to qualify following graduation from Basic Enlisted Submarine School.

FINDINGS

The identifying factors appear to be: poorer scores in arithmetical aptitude, less formal education and, in general, lower grades in Submarine School; that the man is slightly older than the rest of his group, and married; that, if he is an "A" School graduate, some other assignment had intervened between leaving "A" School and reporting for Submarine training.

APPLICATIONS

Delineation of the major factors related to failure of an enlisted Submarine School graduate to qualify provides suggestions as to possible approaches to modifying the selection and training programs, thus improving the personnel situation in the Submarine Service.

ABSTRACT

One hundred and eighty-three enlisted Submarine School graduates who failed to qualify were compared to 185 graduates who had qualified with respect to Basic Test Battery Scores, grades in Submarine School, scores on two paper-and-pencil tests of motivation and emotionality, and selected items of background information.

Enlisted Submarine School graduates who fail to qualify as compared to those who qualify are characterized as follows: (1) earn lower scores in an arithmetical aptitude test; (2) ac¹ieve lower grades in Submarine School; (3) have higher probability not to have finished high school; (4) are slightly older at the time of entering Submarine School; (5) are more likely to have been married; and (6) if an "A" School graduate, the odds are in favor of his having one or more duty assignments intervening "A" School and the onset of Submarine School.

Considering the population sample as a whole, neither the PIB (Personal Inventory Barometer) nor the SMQ (Self-reported Motivation Questionnaire) was related to disqualification.

However, with education as a moderator variable, the PIB scores were significantly related to disqualification thus attesting to the complexity of the etiology of enlisted submarine disqualification.

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FACTORS RELATED TO THE FAILURE OF
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INTRODUCTION

There are, at present, two studies in the submarine literature dealing with the general problem of qualification of enlisted submariner candidates (Kinsey & Weybrew, 1953; King, 1957). Data for the earlier study were obtained from questionnaires completed by the Executive Officer of the submarine to which the disqualified man was assigned. Based upon a sample of 367 submariners collected between 1947 and 1952, this report listed the following characteristics of the enlisted population who failed to qualify: has lower basic test battery scores on the average, includes disproportionately more men with moderate to severe neurotic symptomatology and contains a smaller number of men with high performance marks in Submarine School. Moreover, it was argued in the same paper, that the most relevant etiological factor in disqualification was reduced and/or inappropriate career motivation, though educational achievement and other background variables appeared tentatively, at least to be implicated.

Somewhat similar findings were reported by King (1957) in the second publication mentioned above. Accordingly, this disqualified sample (N=190) tended to obtain lower Basic Test Scores and characteristically demonstrated poorer Submarine School performance, as compared to the matched control group (N=186). Moreover, based upon data collected by means of an opinion questionnaire completed by each man, the disqualified group again demonstrated a higher incidence of maladjustive symptoms and inappropriate attitudes. In addition, since 33% of King's disqualified sample had not attended Submarine School, it was possible to examine grossly, at least, the relationship between School attendance and incidence of disqualification. As a result, it was seen (op. cit. p. 2) that 33% of the disqualified group had not attended Submarine School as compared to 22% of the qualified or control group, a difference significant at the 5% confidence level.

The present study was designed to replicate parts of both of the studies referenced above, in particular, the relationship of disqualification to certain background variables such as education, test battery scores and the like. There are two major differences between the present study and the two previous studies, however. First, all of the disqualified and qualified groups in the present study were Submarine School graduates. Secondly, the data were collected from a sample of men disqualified since the advent of the Fleet Ballistic Missile (FBM) program in 1959. The data for both of the previous studies on the other hand, were collected prior to 1956.

With the FBM program came the two-crew system. At the same time, 60-90 day submerged tours of duty became a reality. Although this study was not designed specifically to delineate the changes in the "qualification picture" attributable to the onset of the FBM "era", nonetheless, it seemed a reasonable assumption that the standards for submariner qualification as well as the opportunities for the candidate to meet these standards would be affected by the modified operating schedules maintained by the new class of submarines.

In short, therefore, this study extends the previous two studies reported in the literature, the goal of this study being to identify and evaluate some of the major factors related to enlisted submariner qualifications in the SSBN age. In addition, delineation of some of the etiological considerations involved in disqualification should provide some criterion information with respect to which the submarine selection data can be evaluated. In turn, enhancement of the efficacy of the existing submarine screening and selection techniques should be one final outcome of such a study.

METHODS AND PROCEDURES

Subjects

The data pertaining to enlisted submariner disqualification originated from a question-

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naire obtained from 183 men who failed to qualify for the service while on duty with the Pacific Submarine Fleet between 1956 and 1962.* The control group was obtained by a matching technique whereby the experimental group (disqualified men) were first broken down by Submarine School Class. Following this, a like-sized random sample was drawn from each of the classes represented in the disqualified group and were then pooled to constitute the so-called qualified group (N=185).

It should be obvious that this matching procedure was essential in order to provide some assurances that certain time-related variables such as time-in-service, age and rate would be at least approximately equivalent for the two groups.**

Experimental Test Instruments

The enlisted submariner selection program is experimental in nature and therefore is continuously being modified as research data accumulates. At the time of this study, the selection battery consisted of two experimental questionnaires in addition to the time-tested Navy Basic Test Battery. One of these experimental tests was called the Self-Reported Motivational Questionnaire (SMQ), (Weybrew & Molish, 1959, Rubin & Parker, 1961). It consisted of fifty items, the contents of which were aimed at "tapping" goals or expectancies associated with volunteering for the submarines, e.g., "I volunteered for submarines because it is the best way to learn nuclear engineering," and at value strength, e.g., "I believe that submariners are the most highly respected men in the Navy," and at the potency of the social mo-

tivation associated with being a member of a high status group, e.g., "I feel that one of the most important advantages of being a submariner is to be looked up to by the other men in the Navy." Fifty of these test items were responded to by means of a multicategory response format extending from "Not at all like me" to "Exactly like me" (Weybrew & Youniss, 1957). The score in use at the time of this study consisted of the sum of 25 (out of 50) items keyed to the pass-fail criterion in Basic Submarine School Training (Rubin & Parker, 1961).

The second experimental questionnaire in use at the time the data for this study were collected was the Personal Inventory Barometer (PIB) (Weybrew & Youniss, 1957). The same multicategory response technique was used to obtain the PIB score consisting of the summed responses to 52 (out of 100 total) neurotic symptom items validated again with the Submarine School attrition criterion. Examples of the type of items making up the PIB score are: "I am more nervous than most people," "My sleep is restless and disturbed," etc.

Data Analytical Techniques

The procedures used in examining the data were straightforward and consisted of an examination of the significance of the differences between distributions of the disqualified and qualified groups for each of the variables under consideration. Where possible, contingency or cross-break techniques were used in order to partition out of the numerous multiple variable interactions the more simple relationships, some of which may have etiological significance for enlisted disqualification.

RESULTS

The disqualified and qualified groups were first compared in terms of the score distributions for each test of the Navy BTB (Basic Test Battery) and for the two experimental tests.

The t-ratios for each of these comparisons are contained in Table I.

*During this time span, only "spotty" returns of submariner disqualification questionnaires were received from the Atlantic Submarine Fleet. Therefore, the decision was made to use only the data from the Pacific Fleet.

**It should be noted that the disqualified group were "contaminated" by data from a few men who had qualified (SS) and had subsequently been disqualified for any number of reasons. The magnitude of this confounding was estimated to be slight (0.5— 1.5%) and therefore could not have significantly affected the results.

TABLE I

Comparison of Test Score and Performance Distributions
for Qualified and Disqualified Groups

Measure	Qualified			Disqualified			
	Mean	S.D.	N	Mean	S.D.	N	P of t
GCT[a]	57.9	7.6	185	56.9	8.4	183	n.s.[b]
ARI	56.2	7.8	185	54.3	8.3	188	<.02
MECH	54.9	7.1	185	53.9	7.3	188	n.s.
CLER	51.3	7.7	185	50.0	7.7	183	n.s.
ARI & MECH	111.1	11.9	185	108.1	14.2	188	n.s.
GCT & MECH	112.8	12.2	185	111.4	15.4	188	n.s.
PIB	102.0	45.7	182	106.9	61.7	182	n.s.
SMQ	150.1	31.5	153	146.1	33.6	152	n.s.
Sub School Grades (Stanine)	5.1	2.0	185	4.0	1.9	183	<.001

[a]See text for explanation of abbreviations.

[b]n.s. = non-significant, i.e., nul probability greater than 10%.

In terms of differences in means of the qualified and disqualified groups, only two variables discriminated between the two groups at the 5% confidence level. In short, higher arithmetic aptitude test scores are earned by the qualified group, who similarly tend to achieve higher grades in Basic Submarine School. It is well to note that the significant difference in arithmetical scores was found in both previous studies (Kinsey and Weybrew, 1953; King, 1957). Also consistent with the two previous studies is the rather convincing positive relationship between grades in Submarine School and the probability of becoming qualified as an enlisted submariner appeared again in the present study (Table I). However, unlike the present study and the earlier one, King found all BTB test scores, except Mechanical Aptitude discriminated between the two groups in the expected direction, that is, the mean scores of the qualified groups were, as a whole, larger.

The scores derived from the two experimental questionnaires, one designed to measure the intensity of the motivation for the submarine service (SMQ) and the other designed to assess the frequency and severity of neurotic symptomatology (PIB), apparently, bear no systematic relationship to the factors accounting for failure to qualify, at least insofar as the scoring keys in use at the time the data were collected are concerned.*

However, the single variable relationships depicted in Table I leave unanswered questions pertaining to the interactive effects of the test battery with the Qualify/Disqualify criterion. Table II presents the data pertinent to these interactions.

It may be recalled that both of the previous studies of enlisted submariner qualification presented data to indicate that the major etiological factors in failure to qualify following Submarine School graduation were essentially motivational in nature. Therefore, the first question to be answered from the data in Table II has to do with the interrelationship of motivation as measured by the SMQ test to the Qualify/Disqualify criterion with the other relevant variables held constant.

*Since these data were analyzed, the items of both the PIB and SMQ were validated item-by-item, using two sizable samples of Qualified and Disqualified enlisted men as the criterion groups. Less than 10% of the items were discriminative, thus indicating the unlikelihood of being able to key tests of this kind to the qualify/disqualify criterion.

Interrelationships of ARI + MECH, PIB, and SMQ Scores
with the Qualify-Disqualify Criterion

| | | Low[a] PIB | | | | High[a] PIB | | | |
| | | Qualified | | Disqualified | | Qualified | | Disqualified | |
		f	%	f	%	f	%	f	%
High (ARI + MECH)	High SMQ	32	(65)	17	(35)	23	(62)	14	(38)
	Low SMQ	17	(50)	17	(50)	23	(50)	23	(50)
		P of X^2 >10% (df=1)				P of X^2 >10% (df=1)			
Low (ARI + MECH)	High SMQ	10	(37)	17	(63)	10	(46)	12	(54)
	Low SMQ	15	(35)	28	(65)	23	(49)	24	(51)
		P of X^2 <0.10 >0.05 (df=1)				P of X^2 >10% (df=1)			
Total Group	High SMQ	42	(55)	34	(45)	33	(56)	26	(44)
	Low SMQ	32	(42)	45	(58)	46	(49)	47	(51)
		P of X^2 <0.10>.05 (df=1)				P of X^2 >10% (df=1)			

[a]All test score distributions dichotomized at the approximate median.

While there are trends in the data indicating that the proportion qualifying is greater in the high motivation group with high aptitude (but not those with low aptitude), these differences fail to reach the 5% criterion of significance. Similarly, individual differences in adjustment as indicated by the PIB score show no trends whatever with respect to the qualify disqualify criterion.

The finding that patterns of responses to personality test items such as found on the PIB do not discriminate between the qualified and the disqualified group, provides at least a partial answer to a question posed by both of the previous disqualification studies (King, 1959; Kinsey & Weybrew, 1953). The question revolves around the interpretation of the finding in both of the previous studies that a higher incidence of neurotic symptoms was found within the disqualified samples, symptoms such as anxiety, loss of confidence, and nervousness. These symptom data, in both of the earlier studies, were collected from the disqualified sample after the disqualification experience had occurred and, may have been the result of the frustration and failure at the time, rather than etiologically related. In contrast, the symptom data,

i.e., the PIB score in the present study, were obtained from both samples at the outset of the eight weeks Basic Submarine course. In brief, within the limits of the content of the PIB items, it can be argued from the present data that the incidence and severity of neurotic symptomatology as indicated by the PIB score are not a likely cause of failure to qualify as an enlisted submariner.

Another finding, consistent with the results of the King (1957) paper, was that a disproportionately larger number of the disqualified group were not high school graduates (37%, N=181), as compared to the qualified group (16%, N=183), this difference being significant at the .005 level (X^2 test). The data from the two earlier disqualification papers, the results of a paper by Parker and Ninow (1962), and the present paper (Table I) all indicate the significant relationship between performance in Submarine School and adjustment differences to operational conditions, including disqualification. Table III extends these findings by presenting data bearing on the question of the interaction of educational achievement and performance level in Basic Submarine School with the Qualify Disqualify criterion.

At the outset, it should be noted that only the extreme ends of the Submarine School performance distribution (54% of the total sample) were used to pinpoint the relationship between grades and qualification or failure to qualify. It is immediately evident that the relationship between grades (stanines*) in Submarine School and the Qualification/Disqualification criterion found in Table I result, in the main, from the contribution of a sub-sample of the total population sample, namely the 74% who were high school graduates. Accordingly, it is seen in Table III that disproportionately more of those Submarine School graduates with high grades (Stanines 7-9) became qualified, and, conversely, fewer of that group become disqualified. While the direction of the differences appear in both educational groups, the 5% reliability criterion was met only by the high school graduate group. It should be noted, however, that the small sample size of non-high school graduates warrants only cautious acceptance of these discrepancies. It is also seen in Table III that 84% of the non-high school graduates, as compared to 58% of the high school graduates in the sub-sample, qualify. That this is an artifact resulting from sampling the extreme stanine groups, is attested to by the fact that 32% of the non-high school graduates and 57% of the high school graduates in the present sample qualify when the remaining stanine 4-6 groups are added. The major point of this discussion is that the probability to qualify is positively correlated with Submarine School performance, although the relationship is more significant in one educational group, as compared to another.

An unexpected variable interaction involving the PIB score was found in the process of analyzing the three-variable crossbreak in Table III. It may be recalled (Table I) that the quality of adjustment as measured by the PIB test had no significant relationship to the qualify/disqualify criterion. However, if one introduces educational achievement as

a moderator* variable, the results are quite different (Table IV).

It should be recalled that with aptitude test scores as a moderator variable (Table II), the PIB scores for the qualified and disqualified groups are almost identical. In contrast, the differences between the two groups in terms of proportion above and below the common dichotomy point (Table IV) is quite distinct. Most important to notice is the tendency for the distribution to skew in opposite directions for the two educational groups who qualified. In a practical vein, the data in Table IV argues that a person with a low score on the PIB test (few neurotic symptoms) has 2-3 times the probability to qualify than does a person with a score above the cut-off for the PIB distribution. However, this is true only if he is a high school graduate. Paradoxically, the predictive situation is almost exactly reversed if the man is a non-high school graduate, i.e., the man has a high probability to qualify if he has a high, rather than a low score.

What is the explanation of these results? There is some literature bearing on these findings (Spielberger, 1962). Briefly, this study showed that college students with low anxiety test scores earned significantly higher grades only if they also had college entrance examination scores in the middle range of the distribution. However, these differences between high and low anxiety (comparable to high and low PIB scores in Table IV), disappeared at both extremes of the aptitude score distribution. Since there is a "strong" positive relationship between educational achievement and aptitude test scores (Rubin & Parker, 1961), the findings in Table IV for high school graduates appear consistent with the Rubin & Parker study, since it would seem to be reasonable to assume that the high school graduates in this sample would "fall" in the middle range of most college entrance examinations. But the

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*Stanine is the abbreviation for "Standard Nine," a standard score distribution with a mean of 5 and a standard deviation of 1.96 units.

*The term moderator variable (Saunders, 1956) as used in psychometrics refers to a variable used as a basis for identifying subgroups within a given population sample, the assumption being that different predictive relationships exist within the subgroups so delineated.

TABLE III

Interrelationships of Education, Submarine School Grades, and Qualification

	Submarine School Grades[a]	Qualified	Disqualified
High School Graduates	Stanine (1-3)	39 (45%)[b]	48 (55%)
	Stanine (7-9)	49 (75%)[b]	16 (25%)
	P of X^2 <.005 (df=1)		
Non-High School Graduates	Stanine (1-3)	12 (75%)[b]	4 (25%)
	Stanine (7-9)	26 (90%)[b]	3 (10%)
	P of X^2 >10% (df=1)		

[a]Grades are in standard score form (stanines). Note that the middle group, stanines 4-6, are omitted.

[b]Percentage of each stanine group becoming qualified.

reversal seen in Table IV for the lower aptitude non-high school graduate was apparently not seen in the Spielberger data. Both studies agree in the general sense that scores on tests designed to measure general emotionality have different meanings in a predictive sense depending upon the ability and/or educational level of the groups under consideration. One plausible explanation of the results in Table IV is that the high PIB Score for the non-high school graduates is indicative of something like "focused tension" tending to compensate for a slight deficiency in ability. On the other hand, the high PIB Score found in the high school graduate subgroup may be related to a kind of emotionality that is more-or-less handicapping for many members of this group.

TABLE IV

Interrelationships of Educational Achievement and PIB With the Qualify/Disqualify Criterion

		Qualified	Disqualified
High School Graduate	High PIB[a]	18 (24%)	56 (76%)
	Low PIB[a]	79 (67%)	59 (33%)
	P of X^2 = <.005 (df=1)		
Non-High School Graduate	High PIB[a]	74 (69%)	33 (31%)
	Low PIB[a]	12 (27%)	32 (73%)
	P of X^2 = <.005 (df=1)		

[a]PIB distributions dichotomized into High and Low at the approximate median of the distribution for the disqualified group. The same scale point is used to split the qualified sample.

The distributions of several variables not contained in the preceding tables were examined for differences between the qualified and disqualified groups. Briefly, the mean age when entering Submarine School was slightly higher for the disqualified group (1% confidence level, t-test). Similarly, disproportionately more of the disqualified group were married (with df=1, p of X^2 < .01).

Both of the previous studies dealing with disqualification failed to show any systematic relationship between pay grade and qualification. In contrast, the present data indicates that 31% of the qualified and 43% of the disqualified samples were rated, (P=.02, X^2, df=1). In view of the well-known fact that the attrition rate in Submarine School is higher and grades generally lower for the non-rated men than for rated (Weybrew, 1958; Rubin & Parker, 1961), the finding that disproportionately more rated men are found in the disqualified sample, is unexpected. It is possible that these group differences could have been in part, the result of a type of sampling artifact often found in data obtained by means of questionnaires transmitted by mail, namely incomplete and non-random samples of returns. In this study, this possibility exists because it was impossible to ascertain the proportion of the disqualified group for whom questionnaires were received. The above finding, and possibly others reported in this study, could have resulted from more complete "returns" for the rated subgroup, and possibly other subgroups of the total population sample. Another possible explanation of this finding is related to the nature of the qualification procedure aboard some of the submarines of the fleet. The protracted work-study program is arduous for some and failure to progress toward qualification at a preordained, (and often unrealistic, for some), rate may result in the loss of certain privileges available to the qualified (SS) crew members. The difficulty in adjusting to this status loss may be more severe for the rated man than for the non-rated, and as a result, may be a significant factor in the rated man's failure to qualify.

One final item of data pertaining to disqualification had to do with differences between enlisted inputs to the Submarine School at Groton from Class "A" Technical Schools throughout the country. At the time these data were collected, approximately 70% of the input to the Submarine School had graduated from at least one "A" School. But, some of the "A" School graduates (about 50%) had received another duty assignment prior to their entering Submarine School. Of relevance for this study is the finding that disproportionately more of the sample of "A" School graduates with a sea or shore assignment intervening "A" School completion failed to qualify as compared to the disqualification rate for the direct input group, (difference significant at the .005 level, X^2 with df=1). The search for an explanation for these differences disclosed that the group entering Submarine School directly from "A" School tended to have higher Mechanical Aptitude Test (MECH) scores and to earn higher grades in Submarine School, than those whose transfer to Submarine School was interrupted by assignment to another billet. These facts taken in the context of the positive correlation between MECH scores and Submarine School grades with probability to qualify suggest at least a partial explanation for the differential relationships of the two "A" School input groups to the qualify/disqualify criterion. Another possibility has to do with the development of inappropriate attitudes during the intervening duty. These attitudes could have, in turn, contributed to the decreased probability of qualifying observed in this group. It should be made clear however, that these statements are wholly conjectural since there are no data in this study bearing directly on that point.

DISCUSSION

The purpose of this study was to identify some of the factors related to the failure of enlisted Submarine School graduates to qualify. The disqualified sample consisted of 183 enlisted Submarine School graduates who failed to qualify while assigned to duty with the Pacific Submarine Fleet between 1956 and 1962. A comparison group consisted of

185 enlisted men matched in terms of date of graduation from Submarine School. Aptitude and Personality test distributions, as well selected background factors were compared for the two groups.

At the outset it was impossible from the data included in this study to obtain even a gross estimate of the incidence of disqualification, a statistic cited in one older report to be of the order of 4-5% (Kinsey & Weybrew, 1952). This incidence statistic is elusive largely because it is impossible to estimate the completeness of the returns of disqualification questionnaires from the Pacific Fleet.

Assuming that the samples of qualified and disqualified enlisted men are representative, Table I showed only that the Arithmetical Aptitude subtest of the BTB discriminated between the two groups. This finding contrasts with two previous submariner disqualification studies involving pre-nuclear submariner candidates inasmuch as these two studies showed that all of the BTB tests correlated with the qualify/disqualify criterion in the expected direction, namely, higher aptitude scores for the qualified group. One explanation for these negative findings is that higher aptitude cut-offs and greater homogeneity of educational achievement found in the present, nuclear age sample may serve to reduce the variance in the BTB distributions and as a result, lessen the likelihood of discrimination between the two groups.

Consistent with both disqualification studies in the literature, grades in Submarine School are significantly predictive of qualification. It should be mentioned also that Submarine School performance is significantly correlated with supervisory ratings of the quality of an enlisted man's adjustment to submarines (Parker & Ninow, 1962). While in no sense constituting proof, these two findings taken together argue strongly for the often-stated assumption that poor performers in the Basic Enlisted Submarine School are poor risks for the Submarine Service.

Neither a personality test designed to measure incidence and severity of neurotic symptomatology (PIB), nor a test validated for the purpose of measuring individual differences in intensity of motivation for the Submarine Service (SMQ) were significantly related to the criterion. One factor contributing to this finding is that each test item making up the scoring keys was validated against the Submarine School Drop-Graduate criterion. The 10-20% of Submarine School class dropped for various reasons quite probably tended to truncate these distributions, thus reducing the likelihood of correlation with the qualify/disqualify criterion. However, the inability to construct an item key validated item-by-item on an independent disqualification sample (see footnote p. 3) attests to the difficulty (if not the impossibilty) of keying personality tests like the PIB and SMQ to a complex criterion such as the Disqualify-Qualify focused on in this present study.

The crux of this difficult predictive problem is that enlisted Submarine School graduates probably fail to qualify for a variety of reasons: aptitude deficiencies, inappropriate or deficient motivation, ineffective habit or trait make up, and possibly the result of other more complex adjustment processes. This enigma may be rather simply stated another way: namely, that the criterion population is non-homogeneous and, as a result, may require separate predictive formulas for the various subgroups included. This problem has already been demonstrated for enlisted men, using Submarine School attrition as the criterion (Weybrew, 1959), and appears to have been demonstrated in this study by introducing the moderator variable of educational achievement (Table IV). Accordingly, if the Submarine School graduate is a high school graduate, absence of emotional symptoms (low scores on the PIB test) increases the likelihood that he will qualify. Conversely, in the segment of the population which has not graduated from high school, high PIB scores, are associated with high probabilities of qualifying. On the face of these findings alone, we have two predictor variables (educational level and PIB score), available at the time the man volunteers for this branch of the service, which would provide a means of identifying those candidates with high probability of qualifying. Such a

procedure is of course impractical in the context of the currently imposed selection ratio (95% or so). Even if the selection ratio were to become more favorable, such a procedure should not be contemplated until these variable interrelationships were revalidated using a larger and possibly a more representative population sample.

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FACTORS RELATED TO THE FAILURE OF ENLISTED SUBMARINE SCHOOL GRADUATES TO QUALIFY

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13. ABSTRACT

One hundred and eighty-three enlisted Submarine School graduates who failed to qualify were compared to 185 graduates who had qualified with respect to Basic Test Battery Scores, grades in Submarine School, scores on two paper-and-pencil tests of motivation and emotionality, and selected items of background information.

Enlisted Submarine School graduates who fail to qualify as compared to those who qualify are characterized as follows: (1) earn lower scores in an arithmetical aptitude test; (2) achieve lower grades in Submarine School; (3) have higher probability not to have finished high school; (4) are slightly older at the time of entering Submarine School; (5) are more likely to have been married; and (6) if an "A" School graduate, the odds are in favor of his having one or more duty assignments intervening "A" School and the onset of Submarine School.

Considering the population sample as a whole, neither the PIB (Personal Inventory Barometer) nor the SMQ (Self-reported Motivation Questionnaire) was related to disqualification.

However, with education as a moderator variable, the PIB scores were significantly related to disqualification thus attesting to the complexity of the etiology of enlisted submarine disqualification.

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